PATENT ABSTRACTS OF JAPAN

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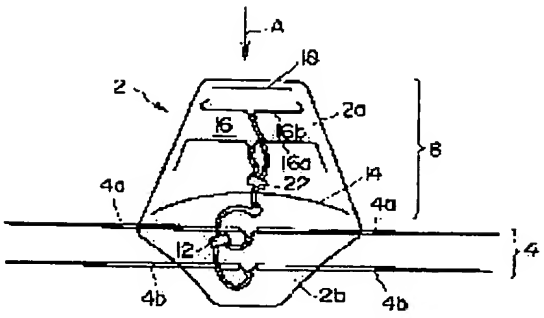
(54) PHASE DIFFERENCE FEED ANTENNA

(57)Abstract:
PROBLEM TO BE SOLVED: To improve the FB ratio and realize the miniaturization.
SOLUTION: Two linear radiators 4a, 4b are disposed in parallel with a specified spacing from each other. Two coaxial cables 10a, 1b of selected different lengths connect the radiators 4a, 4b to a two-way distributor 12 so that reception outputs of the radiators 4a, 4b are inputted in phase to the two-way distributor 12. The spacing between the radiators 4a, 4b is selected to be shorter than the wavelength λ (center wavelength of the two radiators)/8.



CLAIMS

[Claim(s)]
[Claim 1] So that the reception output based on the electric wave which came from the predetermined direction of the radiator of the shape of two straight lines which opened predetermined spacing mutually and has been arranged in parallel, a synthetic vessel, and said two radiators inputted into this synthetic vessel may become in phase The phase contrast electric supply antenna with which it is chosen as die length different, respectively, and two transmission lines which connect said two radiators and said synthetic vessel are provided, and spacing of said two radiators is short chosen from lambda(main wavelength of said two radiators)/8.
[Claim 2] A phase contrast electric supply antenna according to claim 1 is a phase contrast electric supply antenna whose spacing of said two radiators it is an antenna for television broadcasting reception of a low VHF band and a high VHF band, and is about 100mm.
[Claim 3] The phase contrast electric supply antenna which said two radiators consist of with the rod antenna in the phase contrast electric supply antenna according to claim 1.
[Claim 4] The 1st and 2nd radiators arranged in parallel, and the 1st and the 2nd synthetic vessel, The 1st and 2nd transmission lines where die length was chosen so that the electric wave which connects the 1st and 2nd radiators to the 1st synthetic vessel, and comes from the 1st radiator side might be compounded [in / it is in phase and / the 1st composition machine], The 3rd and 4th transmission lines where die length was chosen so that the electric wave which connects the 1st and 2nd radiators to the 2nd synthetic vessel, and comes from the 2nd radiator side might be compounded [in / it is in phase and / the 2nd composition machine], The condition that the 1st and 2nd transmission lines were connected to the 1st composition machine, and the 3rd and 4th transmission lines were separated from the 2nd composition machine, The phase contrast electric supply antenna possessing the means for switching switched to one side while in the condition that the 1st and 2nd transmission lines were separated from the 1st composition machine, and the 3rd and 4th transmission lines were connected to the 2nd composition machine.
[Claim 5] The phase contrast electric supply antenna possessing two transmission lines which are chosen as die length different, respectively and connect said two radiators and said synthetic vessel so that the reception output based on the electric wave which came from the predetermined direction of the radiator of the shape of a straight line which is two from which center frequency differs, a synthetic vessel, and said two radiators inputted into this synthetic vessel may become in phase.
[Claim 6] The phase contrast electric supply antenna with which it is a phase contrast electric supply antenna according to claim 5, and the tip of said two radiators is bent, respectively.
[Claim 7] The phase contrast electric supply antenna with which it is a phase contrast electric supply antenna according to claim 6, and bending is mutually performed to the opposite direction.

[Claim 8] The radiator of the shape of 1st [which opened predetermined spacing mutually and has been arranged in parallel], and 2nd straight line, So that the reception output based on the electric wave of the VHF band from the predetermined direction of the 1st and 2nd radiators inputted into the 1st synthetic vessel and this 1st synthetic vessel may become in phase The VHF band receiving dish whose spacing of said two radiators it is chosen as die length different, respectively, the 1st and 2nd transmission lines which connect said two radiators and said synthetic vessel are provided, and is lambda (main wavelength of said two radiators)/8 or less, The radiator of the shape of 3rd [from which center frequency differs], and 4th straight line ahead arranged rather than the 1st and 2nd radiators, So that the reception output based on the electric wave of the UHF band which comes from said predetermined direction of the 3rd and 4th radiators inputted into the 2nd synthetic vessel and this 2nd synthetic vessel may become in phase The phase contrast electric supply antenna which is chosen as die length different, respectively, possesses the 3rd and 4th transmission lines which connect said two radiators and said synthetic vessel, and possesses the UHF band receiving dish with which the both ends of

the 3rd and 4th radiators are mutually bent by the opposite direction.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the phase contrast electric supply antenna used for television broadcasting reception of for example, a UHF band or a VHF band.
[0002]
[Description of the Prior Art] The Yagi form antenna may be used as a television broadcasting receiving dish of a UHF band and a VHF band. In this Yagi form antenna, in order to make FB ratio good, a reflector, a radiator and the wave director, and three or more components were used, and making a radiator into the shape of V character was performed.
[0003]
[Problem(s) to be Solved by the Invention] However, the whole antenna was large-sized when an element number was made to increase. Moreover, since antenna length required for reception became short when a radiator was made into the shape of V character, the die length of an antenna element had to be lengthened and the whole antenna was large-sized too.
[0004] This invention aims at offering the antenna which turned FB ratio good up and was miniaturized.
[0005]
[Means for Solving the Problem] With the phase contrast electric supply antenna of one mode of this invention, a two straight-lines-like radiator opens predetermined spacing mutually, and is arranged in parallel. It was chosen as the die length from which two transmission lines differ, and said two radiators and said synthetic vessel are connected so that the reception output based on the electric wave which comes from the predetermined direction of said two radiators inputted into a synthetic vessel may become in phase. Spacing of two radiators is short chosen from lambda(main wavelength of said two radiators)/8.
[0006] Thus, since the phase contrast electric supply antenna is used, good FB ratio is obtained to the electric wave from a predetermined direction, and moreover, since spacing of two radiators is short chosen from lambda/4 thru/or lambda/8 usually chosen with the usual phase contrast electric supply antenna, it can miniaturize the whole antenna.
[0007] This phase contrast electric supply antenna can be used as the antenna for television broadcasting reception of a low VHF band and a high VHF band, and can set spacing of said two radiators to about 100mm.
[0008] For example, although spacing of a radiator is set to about 190mm usual when spacing of a radiator is set to about 500mm usual when using a phase contrast electric supply antenna as low VHF bands, and carrying out to high VHF bands Spacing of the radiator of the phase contrast electric supply antenna of this mode is further shortened with about 100mm, can miniaturize the whole antenna, and is the antenna of the still more nearly usable broadband on the both sides of a low VHF band and a high VHF band.
[0009] A rod antenna can constitute said two radiators. Thus, since two radiators can be shortened when are constituted, and not receiving, the whole antenna can be miniaturized further.
[0010] With the phase contrast electric supply antenna of other modes of this invention, the 1st and 2nd radiators are arranged in parallel. The 1st and 2nd transmission lines have connected the 1st and 2nd radiators to the 1st synthetic vessel. Die length is chosen so that the 1st and 2nd transmission lines may compound [in / it is in phase and / the 1st composition machine] the electric wave which comes from the 1st radiator side. The 3rd and 4th transmission lines connect the 1st and 2nd radiators to the 2nd synthetic vessel. Die length is chosen so that the 3rd and 4th transmission lines may compound [in / it is in phase and / the 2nd composition machine] the electric wave which comes from the 2nd radiator side. The 1st and 2nd transmission lines are connected to the 1st composition machine, and while in the condition that the 3rd and 4th transmission lines were separated from the 2nd composition machine, and the condition that the 1st and 2nd transmission lines were separated from the 1st composition machine, and the 3rd and 4th transmission lines were connected to the 2nd composition

machine, a means for switching switches to one side.
[0011] With the phase contrast electric supply antenna of this mode, by switching a means for switching, FB ratio can also be made good to the electric wave which comes from the direction of the 1st radiator, and FB ratio can also be made good to the electric wave which comes from the direction of the 2nd radiator.
[0012] The phase contrast electric supply antenna of another mode of this invention has the radiator of the shape of a straight line which is two from which center frequency differs. It was chosen as the die length from which two transmission lines differ, and said two radiators and said synthetic vessel are connected so that the reception output based on the electric wave which comes from the predetermined direction of said two radiators inputted into a synthetic vessel may become in phase.
[0013] Thus, since the center frequency of two radiators is changed when constituted, it can consider as the antenna which has good FB ratio to the electric wave which is a broadband and comes from a predetermined direction.
[0014] The tip of said two radiators is bendable, respectively. Thus, if constituted, the crosswise dimension of a radiator can be shortened and the whole antenna can be miniaturized.
[0015] Furthermore, two radiators are mutually bendable to an opposite direction. Thus, if constituted, it cannot interfere mutually, and good FB ratio can be obtained, and spacing of two radiators can also be narrowed, and the whole antenna can be miniaturized.
[0016] The phase contrast electric supply antenna of still more nearly another mode of this invention has the VHF band receiving dish and the UHF band receiving dish. The radiator of the shape of 1st [which the VHF band receiving dish opened predetermined spacing mutually, and has been arranged in parallel], and 2nd straight line, So that the reception output based on the electric wave of the VHF band which comes from the predetermined direction of the 1st and 2nd radiators inputted into the 1st synthetic vessel and this 1st synthetic vessel may become in phase It is chosen as die length different, respectively, and the 1st and 2nd transmission lines which connect said two radiators and said synthetic vessel are provided, and spacing of said two radiators is short chosen from lambda(main wavelength of said two radiators)/8. The radiator of the 3rd [from which center frequency differs], and 4th shape of a straight line by which the UHF band receiving dish has been ahead arranged rather than the 1st and 2nd radiators, So that the reception output based on the electric wave of the UHF band which comes from said predetermined direction of the 3rd and 4th radiators inputted into the 2nd synthetic vessel and this 2nd synthetic vessel may become in phase It is chosen as die length different, respectively, the 3rd and 4th transmission lines which connect said two radiators and said synthetic vessel are provided, and the both ends of the 3rd and 4th radiators are mutually bent by the opposite direction.
[0017] thus, with the constituted phase contrast electric supply antenna Ahead, the 3rd and 4th radiators for UHF bands with die length shorter than these are arranged in parallel rather than the 1st and 2nd radiators for VHF bands. And spacing of the 1st and 2nd radiators for VHF bands is chosen narrowly, and since both ends are mutually bent by the opposite direction and spacing is shortened, the 3rd and 4th radiators for UHF bands can also be used as the antenna of a small VHF band and a UHF band.
[0018]
[Embodiment of the Invention] The UHF band and VHF band receiving dish of a gestalt of 1 operation of this invention have the case 2, as shown in drawing 1 . The width method by the side of the arrival direction A of the electric wave for the television broadcasting of the electric wave of the frequency band with which plurality differs, for example, a UHF band, and a VHF band (tip side) is the shortest, and the flat-surface configuration of this case 2 is chosen. It has 2nd trapezoidal shape section 2b to which a width method becomes small gradually as it progresses toward the travelling direction of an electric wave from the base of 1st trapezoidal shape section 2a to which a width method becomes large gradually as it progresses along the travelling direction of an electric wave, and this 1st trapezoidal shape section 2a. The die-length dimension of 1st trapezoidal shape section 2a is chosen for a long time than the die-length dimension of 2nd trapezoidal shape section 2b.

[0019] The phase contrast electric supply antenna 4 for VHF band reception is held in 2nd trapezoidal shape section 2b. On the other hand, the deformation Yagi form antenna 6 for UHF band reception is held in 1st trapezoidal shape section 2a.
[0020] The phase contrast electric supply antenna 4 for VHF band reception has two radiators 4a and 4b, as shown in drawing 2 . These two radiators 4a and 4b are the straight-line-like components of the central electric supply mold constituted by the rod antenna which can expand and contract the die length, for example. These radiators 4a and 4b are perpendicularly arranged to the arrival direction A of an electric wave, and Radiators 4a and 4b are arranged in parallel mutually. As for these radiators 4a and 4b, the distance L1 from the feeding point to a tip is chosen as about 715mm so that the received center frequency lambda may be set to about 160MHz. Baluns 8a and 8b are connected at the feeding point of these radiators 4a and 4b, and these baluns 8a and 8b are connected to the synthetic vessel and the concrete target as a phase composition machine and an example at two distributors 12 through the transmission line 10a and 10b, for example, coaxial cables.
[0021] The die length of coaxial cables 10a and 10b is changed. For example, the die length of coaxial cable 10a which has connected the balun of radiator 4a and two distributors 12 is chosen as about 80mm. On the other hand, the die length of coaxial cable 10b which has connected balun 8b and two distributors 12 of radiator 4b is chosen as about 220mm. Thus, the input signal from [where it is shorter than lambda/8 in which to have changed die length in spacing of Radiators 4a and 4b, for example, it is transmitted to two distributors 12 from two radiators 4a and 4b also as 100mm / A] arrival becomes in phase, and the arrival direction A is for the input signal from an opposite direction to consider as the phase contrast electric supply antenna used as opposition.
[0022] Distance between radiators may be set to about 500mm in the phase contrast electric supply antenna for low VHF bands, and distance between radiators may be set to about 190mm in the phase contrast electric supply antenna for high VHF bands. Although 100mm is low and an object for high VHF bands in the distance between radiators as compared with this, it is very small and the dimension of the arrival direction of an electric wave can be shortened in this phase contrast electric supply antenna.
[0023] Moreover, since Radiators 4a and 4b are constituted by the rod antenna, in this phase contrast electric supply antenna not being used, they can shorten the die length of Radiators 4a and 4b, and can be shortened even in the condition of hardly projecting from the oblique side part of 2nd trapezoidal shape section 2b of a case 2. Moreover, since it is a phase contrast electric supply antenna, good FB ratio is obtained. Drawing 6 (a) is the directional-characteristics Fig. of a high VHF band, for example, this antenna in 198.5MHz, and about 13.2dB and good FB ratio are obtained so that clearly also from this drawing. This drawing (b) is a directional-characteristics Fig. of a low VHF band, for example, this antenna in 112MHz, and about 12.6dB and good FB ratio are obtained so that clearly also from this drawing.
[0024] As shown in drawing 1 , deformation Yagi Antenna for UHF bands has a reflector 14 near the phase contrast electric supply antenna 4a for VHF bands, has the radiator group 16 which becomes a location by the tip side of a case 2 from a phase contrast electric supply antenna rather than this, and has the wave director 18 in the location by the tip side of a case 2 further rather than this radiator group 16.
[0025] A reflector 14 is formed in the shape of [which makes a convex to the tip side of a case 2] radii, and the overall length is about 300mm. It is supposed for holding in a case 2 that it is circular.
[0026] The core of radiator 16a of the radiator group 16 is located in the location by about 40mm side and the tip side of a case 2 from the location which has projected this reflector 14 most. As this radiator 16a is shown in drawing 3 , it is the thing of the shape of a straight line of a central electric supply mold, and both points are turned up at the reflector 14 side. The straight-line-like section of this radiator 16a is arranged almost perpendicularly to the arrival direction A of an electric wave.
[0027] The distance during the feeding point of this radiator 16a is set as about 20mm, it bends from this feeding point, the die length of the straight-line-like section to a point is about 110mm,

and the die length of a bending part is about 40mm. The die length of the straight-line-like section and the bending section is chosen so that this radiator 16a may resonate by about 680MHz of received center frequency. With the gestalt of this operation, the bending include angle of the bending section is bent so that it may become almost parallel to the oblique side of 1st trapezoidal shape section 2a of a case 2 and an obtuse angle may be made to the straight-line-like section, as shown in drawing 1 . However, it is bendable so that the include angle to 90 degrees may be made to the straight-line-like section. Thus, since it has the bending section, it can receive upwards good with desired received center frequency, and radiator 16a can be held in 1st trapezoidal shape section 2a of a case 2.

[0028] The straight-line-like section of radiator 16b is arranged about 90mm rather than the straight-line-like section of this radiator 16a in the location by the tip side of a case 2, for example. Radiator 16b is also the thing of the shape of a straight line of a central electric supply mold, the distance during the feeding point is set as about 15mm, and both ends are bent on the contrary [a reflector 14] at the point side of a case 2. The straight-line-like section of this radiator 16b is arranged at the straight-line-like section of radiator 16a, and parallel. The die length of the straight-line-like section of this radiator 16b is chosen as about 80mm, and the die length of the clinch section is chosen as about 20mm. The die length of the straight-line-like section and the bending section is chosen so that this radiator 16b may resonate by about 800MHz of received center frequency. The bending section also achieves the function as impedance adjustment. This bending section is bent so that the 1st trapezoidal shape section of a case 2 may be met at an oblique side. This bending section is also bendable until the include angle made with the straight-line-like section turns into about 60 degrees. Thus, since it has the bending section, it can receive upwards good with desired received center frequency, and radiator 16b can be held in a case 2. And with Radiators 16a and 16b, since the bending direction of the bending section is an opposite direction mutually, the bending sections of both the radiators 16a and 16b do not produce interference.

[0029] Baluns 18a and 18b are connected at the feeding point of Radiators 16a and 16b, respectively. These baluns 18a and 18b are connected to two distributors 22 as a synthetic vessel, for example, a phase composition machine, and an example through the transmission line 20a and 20b where die length differs, for example, coaxial cables. As for coaxial cable 20a which has connected balun 18of radiator 16a a to two distributors 22, the die length is chosen as about 75mm. Moreover, as for coaxial cable 20b which has connected to two distributors 22 coaxial cable 20b which has connected balun 18of radiator 16b b to two distributors 22, the die length is chosen as 190mm. Having chosen the die length of coaxial cables 20a and 20b in this way By the with the received center frequency of about 800MHz of radiator 16a, and a middle frequency [the received center frequency of about 680MHz of radiator 16b], for example, 740MHz frequency, signal When what was spread from [A] arrival is about 90mm which spacing of Radiators 16a and 16b mentioned above, it is because it is in phase, two distributors 22 are supplied and what was spread from the arrival direction A and the opposite direction is supplied to two distributors 22 by opposition. This spacing of 90mm is about 1 of wavelength with a received center frequency of 740MHz/5, and is shorter than quarter-wave length.

[0030] Since the received center frequency of two radiators 16a and 16b is changed, this radiator group 16 can be broadband-ized. And since Radiators 16a and 16b are performing phase contrast electric supply, good FB ratio is obtained. Moreover, since it considers as spacing shorter than the quarter-wave length of received center frequency and the point of Radiators 16a and 16b is bent further, respectively, spacing of Radiators 16a and 16b can hold Radiators 16a and 16b in a case 2 at a compact.

[0031] From radiator 16b, the wave director 18 is formed in the location by the tip side of a case 2 about 25mm. That die length of this wave director 18 is about 120mm. Thus, with the deformation Yagi form antenna using a reflector 14, the radiator group 16, and the wave director 18, since it has good FB ratio which is a broadband as the radiator group 16 mentioned above, it has FB ratio also with this deformation Yagi form antenna good in a broadband. Drawing 7 is the directional-characteristics Fig. of a UHF band, for example, this antenna in 630MHz, and about 17.4dB and good FB ratio are obtained so that clearly also from this drawing. Moreover, with the

gestalt of this operation, deformation Yagi Antenna for UHF bands exists ahead [of the radiators 4a and 4b of the receiving antenna of a VHF band] (in direction near the electric-wave arrival direction), the distance of the reflector 14 of that and radiator 4a of a VHF band is about 50 thru/or 100mm, and in reception of a UHF band, since radiator 4a also functions as a radiator, FB ratio is further made good.

[0032] In addition, although illustration is omitted in drawing 1 , in fact, an amplifier is formed in the receiving antenna for a UHF band and VHF bands, and it is constituted by the so-called active antenna. And as shown in drawing 4 , after the reception output of the radiators 4a and 4b for VHF bands is amplified with Amplifiers 24a and 24b, it is supplied and compounded by two distributors 12 through coaxial cables 10a and 10b. Similarly, after the reception output of the radiators 16a and 16b for UHF bands is also amplified with Amplifiers 26a and 26b, it is supplied and compounded by two distributors 22 through coaxial cables 20a and 20b. This is because a S/N ratio is improvable rather than it amplifies after composition with two distributors 12 and 22.

[0033] In addition, with the gestalt of the above-mentioned operation, although it constituted from a receiving dish of a VHF band so that FB ratio might be made good to the electric wave from [A] arrival, FB ratio can also be made good by choosing the die length of coaxial cables 10a and 10b to the electric wave which comes from a direction conversely opposite to the arrival direction A.

[0034] Furthermore, with the arrival direction A, as this is developed, for example, it is shown in drawing 5 , it can also constitute so that FB ratio to the electric wave from B of an opposite direction may be made good, and it may be switched, so that FB ratio to the electric wave from [A] arrival may be made good.

[0035] That is, the coaxial cables 110a and 110b which chose die length so that FB ratio to the electric wave from Direction B might be made good are prepared besides the coaxial cables 10a and 10b which chose die length so that FB ratio to the electric wave from [A] arrival might be made good. It replaces with one more distributors [two] 12, and two distributors [two] 12a and 12b are prepared. The end of the core wire of coaxial cables 10a and 10b is connected to 2 distributor 12a, and the other end of each core wire is connected to the end of the baluns 8a and 8b of Radiators 4a and 4b through a means for switching 120a and 120b, for example, PIN diodes. The outer conductor of coaxial cables 10a and 10b and the other end of Baluns 8a and 8b are grounded with grounded plates 122a and 122b. Similarly, the end of the core wire of coaxial cables 110a and 110b is connected to 2 distributor 12b, and the other end of each core wire is connected to the end of the baluns 8a and 8b of Radiators 4a and 4b through a means for switching 120c and 120d, for example, PIN diodes. The outer conductor of coaxial cables 110a and 110b is also grounded with grounded plates 122a and 122b.

[0036] And when receiving the electric wave from [A] arrival by good FB ratio, a suitable direct current is supplied from the 2 distributor 12a side, and it is made to flow through PIN diodes 120a and 120b. Moreover, when receiving the electric wave from [B] arrival by good FB ratio, a suitable direct current is supplied from the 2 distributor 12b side, and it is made to flow through PIN diodes 120c and 120d. That is, when the group of PIN diodes 120a and 120b has flowed, as a PIN diodes [120c and 120d] group does not flow, when the group of PIN diodes 120a and 120b has not flowed conversely, control is performed so that a PIN diodes [120c and 120d] group may flow.

[0037] Although the receiving antenna 4 for VHF bands and the receiving antenna 6 for UHF bands were formed in the case 2 and used as the receiving antenna of a VHF band and a UHF band with the gestalt of the above-mentioned operation, the receiving antenna 4 for VHF bands and the receiving antenna 6 for UHF bands can also be used according to an individual, respectively. Moreover, although the receiving antenna 4 for VHF bands was constituted in a low VHF band and high VHF band combination, it can choose appropriately the die length of Radiators 4a and 4b, and can also constitute [only for low VHF bands or] it only on high VHF bands.

[0038]

[Effect of the Invention] As mentioned above, according to this invention, it is small and FB ratio

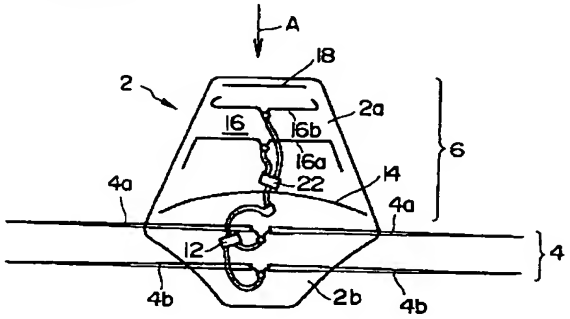
can obtain a good phase contrast electric supply antenna. Furthermore, FB ratio can also obtain a good phase contrast electric supply antenna in a broadband, and the phase contrast electric supply antenna which can switch the direction which can make FB ratio good can also be offered.

DESCRIPTION OF DRAWINGS

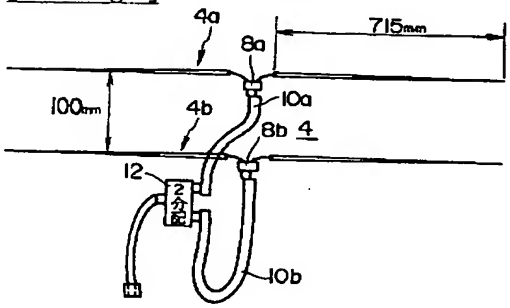
[Brief Description of the Drawings]
[Drawing 1] It is the outline block diagram of the antenna of 1 operation gestalt of this invention.
[Drawing 2] It is the outline block diagram of the receiving antenna for VHF bands currently used for the antenna of drawing 1 .
[Drawing 3] It is the outline block diagram of the radiator currently used for the receiving antenna for UHF bands currently used for the antenna of drawing 1 .
[Drawing 4] It is the block diagram of the antenna of drawing 1 .
[Drawing 5] It is the outline block diagram of the modification of the receiving antenna for VHF bands of drawing 2 .
[Drawing 6] It is the directional-characteristics Fig. of the low VHF band in the antenna of drawing 1 , and a high VHF band.
[Drawing 7] It is the directional-characteristics Fig. of the UHF band in the antenna of drawing 1 .
[Description of Notations]
2 Case
4 Receiving Antenna for VHF Bands
4a 4b Radiator
10a 10b 20a 20b Coaxial cable (transmission line)
12 Two Distributors (Synthetic Vessel)
16 Radiator Group of Receiving Antenna for UHF Bands
16a 16b Radiator

DRAWINGS

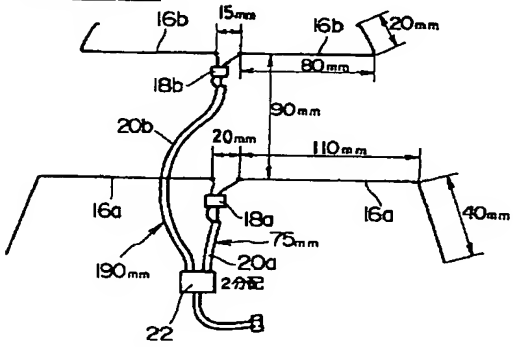
[Drawing 1]



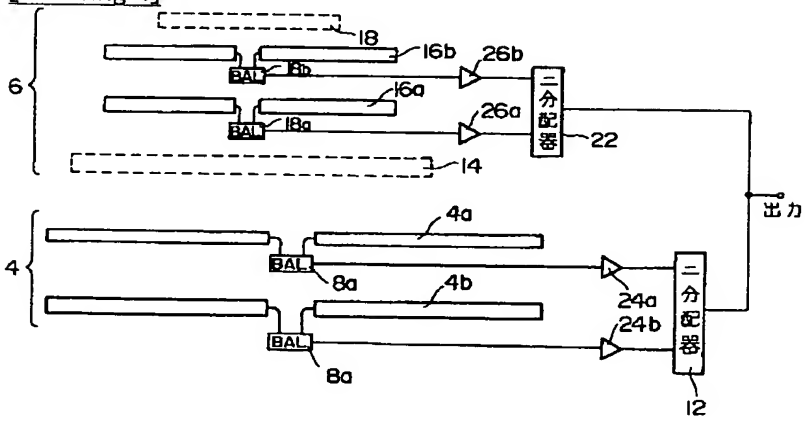
[Drawing 2]



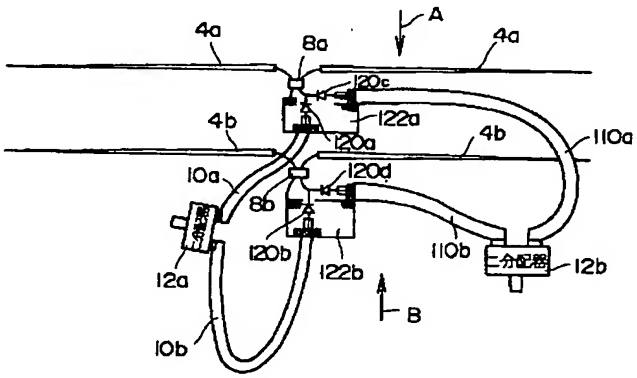
[Drawing 3]



[Drawing 4]

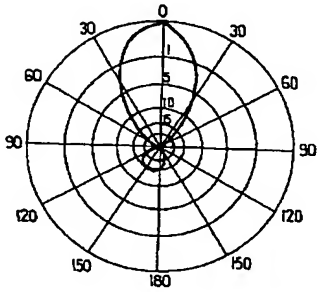


[Drawing 5]



[Drawing 6]

(a)



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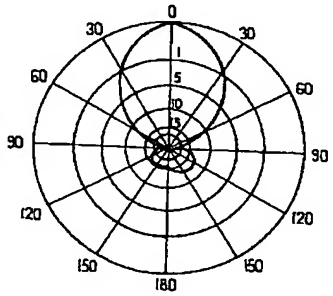

[Drawing 7]